

Safety of Vaccines Affected by a Power Outage

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In a major power outage, healthcare providers have many critical issues to consider and the safety of vaccines may not be considered a high priority. Vaccines are an important adjunct in preventing infectious diseases and are costly to produce and maintain. For example, the National Immunization Program of the Centers for Disease Control and Prevention (CDC) has invested \$ 150 million to provide and maintain vaccine inventories in the field.¹ The CDC urges emergency planners to include methods to minimize the potential loss of vaccines from natural disasters and other emergencies. Because multiple products require refrigeration or freezing,² a power outage presents a significant threat to the safety and efficacy of vaccines.

ADVANCE PLANNING

Maintaining storage temperatures

Certain vaccines do not tolerate temperature extremes and healthcare agencies should have a plan to keep vaccines safe if there is a loss of refrigeration.³ If necessary, vaccines should be transferred to an alternate storage facility (e.g., hospital, packing plant, state depot) that has a back-up power source (e.g., generators) and an ability to monitor the storage site temperatures. An adequate number of trained personnel, equipment, and vehicles are needed to pack and transport the vaccines. Table 1 is a checklist of important agencies that may be called upon if there is a power outage. Readers are encouraged to fill in the emergency telephone numbers for a given geographic area.

Obtaining vaccines from storage during power outage

Disaster planners should evaluate storage facilities and provide a plan for entering the facility during an emergency.¹ A floor diagram should be provided that includes the location of doors, flashlights, spare batteries, light switches, keys, locks, alarms, circuit breakers, and packing materials. In the event that vaccines need to be trans-

Table 1. Planning guide for emergency contact telephone numbers for safe vaccine storage or transport

Resource:	Telephone Number
Electrical power company:	
Refrigeration repair company:	
Temperature alarm monitoring company:	
Perimeter alarm repair company:	
Perimeter alarm monitoring company:	
Backup storage facility:	
Transportation to backup storage:	
Dry ice vendor:	
Emergency generator repair company:	
National weather service:	
Manufacturers:	
Merck Sharpe & Dohme:	800-672-6372
Aventis Pasteur:	800-VACCINE (800-822-2463)
GlaxoSmith Kline:	888-825-5249
Wyeth Lederle Labs:	800-666-7248
Additional assistance:	
Equipment problems	
Packing containers, cold packs, dry ice	
Backup storage	
Backup transportation	
Security	

ported, a standardized procedure should be in place to list which vaccines are packed first, how to handle varicella vaccine, and how to ensure safe transport. The CDC recommends that plans include how to load a transport vehicle, the preferred and alternate transport routes to an alternate storage facility, and how to store the vaccines at the back-up facility.

VACCINES INVOLVED IN A POWER OUTAGE

Evaluating safety of vaccines

The CDC stresses that healthcare providers should not administer or discard compromised vaccine until consulting with public health officials, the CDC, or individual

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vaccine manufacturers (list available at <http://www.cdc.gov/nip/news/poweroutage.htm#manufac>). Officials will help to determine if any vaccines should not be used. Immunization providers who receive vaccine from state or local public health programs should contact their respective programs to determine if compromised vaccine should be returned for credit.

Protecting storage temperatures

The CDC advises that freezers and refrigerators used for vaccines should not be opened until power is restored. Most refrigerated vaccines are relatively stable at room temperature for limited periods of time.² The vaccines of most concern are measles-mumps-rubella (MMR) and varicella virus vaccine live (VARIVAX®), which are sensitive to elevated temperatures. MMR may retain potency at room temperature, depending on the duration of exposure. VARIVAX is to be kept at a continuous frozen state (-15°C) or colder, and *no freeze-thaw cycles are allowed with this vaccine*. If VARIVAX is involved in a power outage, healthcare providers should contact Merck, the manufacturer, for re-evaluation of the product's potency before using the vaccine.

Monitoring storage temperatures

In the event of extended power outages, temperatures should be monitored as much as possible. The units should not be opened to check temperatures. However, after the power is restored, providers should record the duration of the outage and the temperature as soon as possible. This data will provide the maximum temperature and duration of exposure to elevated temperatures.

Vaccines transferred to an alternative storage with reliable power sources need constant temperature during transport. Both the temperature of the refrigerator(s) and freezer(s) from which the vaccines are removed and the

temperature the vaccine is exposed to during transport should be recorded.

When power has been restored, the temperature of the storage unit should be recorded as soon as possible as well as the amount of time it takes to reach the normal $2 - 8^{\circ}\text{C}$ range in the refrigerator, or -15°C or less in the freezer. The duration of increased temperature exposure and the maximum temperature observed should also be recorded. Exposed vaccines should be separated from any new product and stored at the proper temperature if possible. Any vaccine determined not to be viable may be returned to the vaccine supplier. The state or local health department will work with providers to help facilitate handling vaccine supplies.

SUMMARY

Vaccines are an important adjunct to preventing infectious diseases. Vaccines are costly to produce and store because of sensitivity to temperature changes. Therefore, advance planning for the safe handling of vaccines before a power outage can help to ensure the availability of these agents and to significantly reduce the costs associated with disasters.

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